CLAIMS

WHAT IS CLAIMED IS:

1.   A method for handling out-of-order frames, comprising:

(a)   receiving an out-of-order frame via a network subsystem;

(b)   placing data of the out-of-order frame in a host memory; and

(c)   managing information relating to one or more holes in a receive window.

2.   The method according to claim 1, wherein the out-of-order frame is received via a TCP offload engine (TOE) of the network subsystem or a TCP-enabled Ethernet controller (TEEC) of the network subsystem.

3.   The method according to claim 1, wherein the network subsystem does not store the out-of-order frame on an onboard memory.

4.   The method according to claim 3, wherein the network subsystem does not store one or more missing frames relating to the out-of-order frame.

5.   The method according to claim 1, wherein the network subsystem comprises a NIC.

6.   The method according to claim 1, wherein (b) comprises placing the data of the out-of-order frame in the host memory if the out-of-order frame is determined to be inside the receive window.

7.   The method according to claim 1, further comprising:

dropping the out-of-order frame if the out-of-order frame is determined not to be inside the receive window.

8.   The method according to claim 1, further comprising:

placing a portion of the data of the out-of-order frame in the host memory, the portion of the data being inside the receive window.

9.   The method according to claim 1, wherein (c) comprises one or more of the following:

storing information relating to a new hole created by the placement of the data of the out-of-order frame,

updating information relating to an existing hole modified by the placement of the data of the out-of-order frame, and

deleting information relating to a plugged hole created by the placement of the data of the out-of-order frame.

10.   The method according to claim 9,

wherein the stored information resides on the network subsystem,

wherein the updated information resides on the network subsystem, and

wherein the deleted information resided on the network subsystem.

11.   The method according to claim 1, wherein the managed information resides on the network subsystem.

12.   The method according to claim 1, further comprising:

updating the receive window based upon the placement of the data of the out-of-order frame.

13.   The method according to claim 1, further comprising:

setting a programmable limit with respect to a number of holes allowed in the receive window.

14. The method according to claim 1, wherein (b) comprises mapping TCP space into host buffer space.

15. The method according to claim 1, wherein the network subsystem comprises a memory whose memory usage scales with a number of holes in the receive window.

16. The method according to claim 1, wherein the network subsystem comprises a memory whose memory usage does not scale with a number of out-of-order frames received.

17. A method for handling out-of-order frames, comprising:

parsing an out-of-order frame into control information and data information;

processing at least one of the control information, the data information and context information to determine a buffer location in a host memory in which to place the data information; and

managing receive window hole information.

18. The method according to claim 17, wherein a network subsystem is adapted to parse the out-of-order frame into control information and data information.

19. The method according to claim 17, wherein a network subsystem is adapted to process at least one of the control information, the data information and the context information to determine the buffer location in the host memory in which to place the data information.

20. The method according to claim 17, wherein a network subsystem is adapted to manage receive window hole information generated by the placement of the data information.

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21.   The method according to claim 20, wherein a network subsystem is adapted to store the receive window hole information managed by the network subsystem.

22.   The method according to claim 17, wherein the receive window hole information comprises TCP receive window hole information.

23.   A system for handling out-of-order frames, comprising:

a host comprising a host memory; and

a network subsystem coupled to the host via a host interface,

wherein the network subsystem is adapted to process an out-of-order frame,

wherein the network subsystem is adapted to place data of the out-of-order frame in a host memory, and

wherein the network subsystem is adapted to manage information relating to one or more holes in a receive window.

24.   The system according to claim 23, wherein the network subsystem comprises a TOE or a TEEC that provides flow-through processing and placement of the data of the out-of-order frame in the host memory.

25.   The system according to claim 23, wherein the data is placed in a temporary buffer, an upper layer protocol (ULP) buffer or an application buffer residing in the host memory.

26.   The system according to claim 23, wherein the network subsystem is adapted to process at least one of control information and data of the out-of-order frame to determine a buffer location in the host memory in which to place the data.

27. The method according to claim 23, wherein the network subsystem is adapted to store the information relating to the one or more holes in the receive window.

28. The method according to claim 23, wherein the network subsystem is not adapted to store the out-of-order frame on the network subsystem until one or more missing frames are received by the network subsystem.

29. The method according to claim 23, wherein the network subsystem comprises a NIC.